

## **Forests and forestry in Poland and other EU countries**

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### **ABSTRACT**

The paper provides general information about forests and forestry in Poland against a background of other EU Member States. Based on the data published in various international sources of statistical data it presents the information of forest resources, forest health condition, protection of forests, occurrence of forest fires, employment in forestry and related sectors, as well as selected aspects of production and trade of wood and wood products and also generation and use of renewable energy. The paper concludes that Poland is characterized by vast forest and timber resources, however in view of a large area of the country and large population share of forest lands in the total area of the country and the average forest area per inhabitant are low. The high share of protected areas makes Poland one of the leaders in forest protection, however Polish forests are very vulnerable to fires. Poland is a significant producer of wood-based panels, sawnwood and pulpwood, as well as paper and cardboard.

### **KEY WORDS**

forestry statistics, forest economics, EU Member States, sustainable forest management

### **INTRODUCTION**

Forests and forestry are the most important components of forest economy. Forests and other wooded land cover over 40% of the European Union land area. They serve economic, social and environmental purposes and therefore are multifunctional. Forest safeguard habitats for animals and plants and play a significant role in mitigating climate change and providing other environmental services. About 25% of the EU forest area is protected under Natura 2000, and much of the rest is home to species protected under EU nature legislation. Forests also offer various societal benefits, including for human health, recreation and tourism. The socio-economic importance of forests is high, but often under-

estimated. Forests contribute to rural development and provide around three million jobs within the whole EU. Wood is still the major source of financial revenue from forests. Wood is also considered an important source of raw material for emerging bio-based industries, as well as renewable source of energy (Communication 2013).

A considerable diversity of European and world forests has contributed to the creation of a number of definitions of forest and woodland. According to the UNECE/FAO “forest” is land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. Forest is determined both by the presence of trees and

the absence of other predominant land uses. Additionally, “other wooded land” is land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 m and a canopy cover of 5–10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use (GUS 2013).

The paper provides general information about forests and forestry in Poland against a background of other EU Member States. It presents the following issues: forest resources (total area, share of forests in the total area of a country, forest area per 1 inhabitant, standing volume – in total and per 1 hectare), forest health condition (rate of crown defoliation), protection of forests (share of protected areas), occurrence of forest fires (their number and the total area), employment in forestry and related sectors, as well as selected aspects of production and trade of wood and wood products and also generation and use of renewable energy. The description is based on several sources of information, including:

- Global Forest Resources Assessment 2010 (FRA 2010),
- FAO Statistical Yearbook 2013,
- State of Europe’s Forests 2011. Status and Trends in Sustainable Forest Management in Europe (Forest Europe 2011),
- Forest Condition in Europe 2013 Technical Report of ICP Forests (Michel et al. 2014),
- Forest Fires in Europe, Middle East and North Africa 2012 (2013),
- FAO Yearbook of Forest Products 2011 (2013),
- Yearbook of agriculture, forestry and fishery statistics – 2013 edition (Eurostat 2013),
- Forestry 2013 (GUS 2013).

#### **Forest resources in Poland and in other EU Member States**

According to the “Global Forest Resources Assessment 2010” report (FRA 2010) the total area of forests in the 28 EU countries amounted to 158.6 million hectares, while the total area of the other wooded land (OWL) amounted to 21.2 million hectares. Altogether this is equivalent to 42% of EU land area. More than 60% of European forests and OWL lie in the territory of five Member States: Sweden, Finland, Spain, France and

Germany. The total area of forestland in Poland is over 9.3 million hectares (representing 5.2% of Europe’s total forestland). This places Poland in the 7<sup>th</sup> position among the countries with the largest forest cover (tab. 1). Contrary to what is happening in other parts of the world, forest cover in the EU is slowly but steadily increasing year-to-year. In the whole period 2000–2005, the increase was approximately 0.7 million hectares, or 0.4% of total forest area of our continent. The largest increase has been noted in Spain – 0.3 million hectares and in Italy – 0.1 million hectares (1.1%). Moreover, it should be emphasized that the forest area in that period did not decrease in any of the EU countries (FRA 2010).

**Table 1.** The total area of forests and other wooded land in 2010 in the most forested EU Member States

No.	Country	The total area (thous. ha)
1.	Sweden	31 247
2.	Spain	27 748
3.	Finland	23 269
4.	France	17 572
5.	Germany	11 076
6.	Italy	10 916
7.	Poland	9 337
8.	Romania	6 733
9.	Greece	6 539
10.	Austria	4 006

Source: Global Forest Resources Assessment 2010.

As seen in table 2, Finland is the country with the highest forest cover – 77%, followed by Sweden – 76% and Slovenia – 63%. Ireland and the Netherlands (11%), as well as the UK (12%) are among the countries with the smallest forest cover. Poland with the share of forests in the total land area of the country accounted to 30% in 2010, occupied the 19<sup>th</sup> position among the EU countries and was close to France and Germany (32% each).

However, it should be pointed out that such high forest cover in the Mediterranean countries (Portugal – 41%, Spain – 56%) is due to the high proportion of other wooded lands, whereas such areas are not included in the statistics of the Central European countries (Germany, Poland, Slovakia, Hungary, the Czech Republic). When taking into account only forest cover, the 5 most forested countries are mostly those located in the

northern part of the European Union, i.e. Finland, Sweden, Slovenia, Latvia and Estonia, while Poland ranks at the 17<sup>th</sup> position within the UE countries.

**Table 2.** Share of forest land in a total area of country in the most forested EU Member States and in Poland in 2010

No.	Country	Share of forest and OWL (%)
1.	Finland	77
2.	Sweden	76
3.	Slovenia	63
4.	Latvia	56
5.	Spain	56
6.	Estonia	55
7.	Greece	51
8.	Austria	49
9.	Croatia	44
10.	Slovakia	36
...	...	...
19.	Poland	30

Source: Global Forest Resources Assessment 2010.

Also, the area of forests and other wooded land per inhabitant in Poland is lower (18<sup>th</sup> position, together with Hungary, Italy, Ireland and Luxembourg, ) than the European average (tab. 3).

**Table 3.** The area of forests and other wooded land per inhabitant in the most forested EU Member States and in Poland in 2010

No.	Country	The forest area per 1 inhabitant (ha)
1.	Finland	4.3
2.	Sweden	3.3
3.	Estonia	1.7
4.	Latvia	1.5
5.	Lithuania	0.7
6.	Croatia	0.6
7.	Greece	0.6
8.	Slovenia	0.6
9.	Spain	0.6
10.	Bulgaria	0.5
...	...	...
18.	Poland	0.2

Source: Forest Europe 2011.

The ownership structure of forests in Europe in 2010 shows high variability. More than 50 per cent of EU forests are in private hands. There are significant differences in the proportion of forests in private ownership among individual EU countries. The greatest areas of forests in this category are in Portugal (98.4%), Slovenia (76.8%), Denmark (75.3%), Austria (74.3%) and France (74.2%). The publicly-owned forests dominate in the former “Eastern block” countries, i.e. in Bulgaria (11.0%), Poland (17.8%), the Czech Republic (23.2%) and Romania (31.2%), but also in Greece (22.5%) and Cyprus (31.2%) (Forest Europe 2011).

Growing stock in the EU-28 amounts to 24.4 billion cubic metres. Almost 48% of all wood resources are located in four Member States: Germany (3.5 billion cubic metres), Sweden (3.4 billion cubic metres), France (2.4 billion cubic metres) and Finland (2.2 billion cubic metres; tab. 4).

**Table 4.** Standing volume in the most wood-rich EU Member States in 2010

No.	Country	The standing volume (million m <sup>3</sup> )
1.	Germany	3492
2.	Sweden	3358
3.	France	2584
4.	Finland	2189
5.	Poland	2049
6.	Romania	1390
7.	Italy	1384
8.	Austria	1135
9.	Spain	913
10.	Czech Republic	769

Source: Global Forest Resources Assessment 2010.

**Table 5.** Average standing volume per hectare in the most wood-rich EU Member States in 2010

No.	Country	Average timber volume (m <sup>3</sup> /ha)
1.	Slovenia	332
2.	Germany	315
3.	Luxembourg	299
4.	Austria	292
5.	Czech Republic	290

1	2	3
6.	Slovakia	266
7.	Belgium	248
8.	Malta	231
9.	Poland	219
10.	Lithuania	218

Source: Global Forest Resources Assessment 2010.

This position is due to the high volume of standing timber in our country amounting to 203 m<sup>3</sup> of timber per hectare of forest area compared to the European average of around 180 m<sup>3</sup>/ha, though Poland in this respect is ranked 9<sup>th</sup> in Europe (tab. 5).

### Health condition and protection of forests in Poland and in other EU Member States

The role and functions of forests and forest management in Europe are complex and diversified. The major problem of forest management is conservation of biological diversity, mitigation of climatic change resulting from human activity, conservation of water resources and supply of biomass for energy purposes. The implementation of the above-mentioned functions is put at risk by a number of factors. The most hazardous threats are contamination of air, waters and soil, fires, weather anomalies (storms, droughts, low temperatures, floods, etc.) and pests (insects, fungi, etc.). European forests are an object of particular concern and protection; they are under permanent control through monitoring of the natural environment. Forests are also an object of research and promotion by modern (sustainable and multifunctional) forest management set in the documents such as resolutions adopted at Ministerial Conferences on the Protection of Forests (Strasbourg (1990), Helsinki (1993), Lisbon (1998), Vienna (2003), Warsaw (2007) and Oslo (2011), national forest policies (e.g. Poland, 1997), EU Forest Strategy (1998), EU Forest Action Plan (2006), and the new EU Forest Strategy (2013).

The health condition of forests is measured by the level of damage to tree assimilation apparatus consisting in the assessment of the degree of foliage loss compared to healthy trees, that is the assessment of crown defoliation. The results of defoliation assessment show that most of the EU forests (77.4%) were in good health

condition (classes 0 and 1), the average defoliation rate amounted to 24.2% for coniferous forests and 38.7% for broadleaved ones.

The causes of foliage loss in forest trees are monitored at about 860 study sites (permanent observation plots) located in the most important forest ecosystems throughout Europe. The data on crown defoliation (main parameters and assessment period are given in parentheses) have been collected from the middle of 1990s and include:

- crown condition (defoliation, change of colour, causes of damage – every year),
- forest productivity (diameter, growth, biomass – every five years),
- condition of forest floor vegetation (percentage coverage by species – every five years),
- weather phenomena (atmospheric precipitation, air temperature, relative humidity, isolation, speed and direction of wind – permanently),
- phenological phenomena (changes of colour, loss of leaves and needles – annually),
- air quality (ozone, ammonium, sulphur – permanently),
- damage to the ozone layer (damage level – in testing),
- soils (acidity, nitrogen, sulphur, coal, other nutrients, heavy metals – permanently),
- foliage and litter (acidity, nitrogen, sulphur, coal, other nutrients, heavy metals – permanently).

When comparing average defoliation of forest trees among the EU Member States, Poland is ranked in the 13<sup>th</sup> position (tab. 6).

**Table 6.** The assessment of crown defoliation in some EU Member States and in Poland in 2012

No.	Country	Average foliage loss in forest trees (%)
1	2	3
1.	Ireland	1.0
2.	Denmark	7.3
3.	Estonia	7.8
4.	Latvia	9.2
5.	Cyprus	10.6
6.	Romania	13.9
7.	Austria	14.2 (2010)
8.	Finland	14.3

1	2	3
9.	Sweden	15.9
10.	Spain	17.5
...	...	...
12.	Poland	23.4

Source: Michel et al. 2014.

The deterioration of the health condition of forests and the growing human pressure on forest ecosystems in Europe have necessitated their special protection. European programs for the protection of forest resources, such as Natura 2000 are being developed parallel to the national programs. Poland is in the group of countries giving forest protection the highest attention. As regards the size of protected areas, our country occupies the second position among the European countries. Also, the share of protected areas in the country's total area at a level of 22.4 per cent puts Poland in the fifth position within the EU (tab. 7).

**Table 7.** The share of protected areas in the country's total area in 2009

No.	Country	Share of protected areas (%)
1.	Germany	42.4
2.	Great Britain	26.4
3.	Slovakia	23.2
4.	Austria	22.9
5.	Poland	22.4
6.	Estonia	20.4
7.	Latvia	18.0
8.	Malta	17.3
9.	France	16.5
10.	Greece	16.2

Source: FAO Statistical Yearbook 2013.

### Fires and windstorms in forests in Poland and in other EU Member States

Fires are considered one of the major threats to forests in the EU countries. Forest fire data have been collected each year by EU Member States for 25 years. The data are checked and stored in the EU Fire Database (EFFIS – *European Forest Fire Information System*) which is managed by *Joint Research Centre* (JRC). Statistics on forest fires in the European countries are also published in the yearly report *Forest Fires in Europe*.

At present, the database covers 38 countries (involving also some Middle East and North African countries), including 24 EU Member States countries. It contains fire frequency and burned area data statistics (tab. 8 and 9).

**Table 8.** The number of forest fires in the most exposed EU Member States in 2012

No.	Country	Number of forest fires
1.	Portugal	21 176
2.	Spain	15 902
3.	Poland	9 265
4.	Italy	8 252
5.	Croatia	7 870
6.	France	4 105
7.	Hungary	2 657
8.	Sweden	2 213
9.	Greece	1 559
10.	Romania	882

Source: Forest Fires in Europe 2012.

**Table 9.** The area of forest fires in the most exposed EU Member States in 2012

No.	Country	Area (ha)
1.	Spain	209 855
2.	Italy	130 814
3.	Portugal	110 231
4.	Croatia	80 252
5.	Greece	59 924
6.	Hungary	13 978
7.	Bulgaria	12 730
8.	France	8 600
9.	Poland	7 235
10.	Romania	6 299

Source: Forest Fires in Europe 2012.

The most forest fires affected countries are: Portugal, Spain, France, Italy and Greece, i.e. concentrated in the Mediterranean region. In 2012 in these countries a total area burned amounted to 519,424 ha. This was well above the average of the last 20 years (400 thousand ha). On the other hand, the number of fires that occurred (almost 51 thousand) is below the average (Forest Fires in Europe 2012). In other ("non-southern")

EU Member Countries there were about 26.2 thousand fires occurred in 2012, covering the total area of 124.2 thousand hectares. In 2012, Poland was ranked on the 3<sup>rd</sup> position as regards the number of forest fires and on the 9<sup>th</sup> position in terms of the total area of forest fires.

### Production and trade of wood and wood products in Poland and in other EU Member States

The “FAO Yearbook of Forest Products 2011” is the main source of statistical data on roundwood production. The EU is one of the world’s greatest producers of roundwood. The volume of annual roundwood harvest amounts to approx. 422 million m<sup>3</sup>. Timber production over the last decade in the EU countries has increased by only 5 per cent reaching 425 million cubic metres in 2011. Softwood production prevailed (about 70% of total production).

The most important timber producers (total merchantable timber, data as of 2011) in Europe are: Sweden (71.9 million m<sup>3</sup>), Germany (56.1 million m<sup>3</sup>), France (55.0 million m<sup>3</sup>), Finland (50.8 million m<sup>3</sup>) and Poland (37.2 million m<sup>3</sup>). The roundwood production in these countries is estimated at nearly 65% of Europe’s total production. A substantial portion of timber produced by forests in Europe is commercial timber, with 340 million m<sup>3</sup> in 2011, or nearly 73% of total timber raw material. The rest was fuel wood. Among the EU Member Countries the volume of harvested timber per capita ranks Poland 10<sup>th</sup> in Europe (tab. 10).

**Table 10.** The volume of harvested timber per capita the EU Member States in 2011

No.	Country	Volume of harvested timber per 1 inhabitant (m <sup>3</sup> )
1.	Finland	9.42
2.	Sweden	7.63
3.	Latvia	6.34
4.	Estonia	5.35
5.	Lithuania	2.35
6.	Austria	2.22
7.	Slovakia	1.70
8.	Czech Republic	1.46
9.	Portugal	1.04
10.	Poland	0.79

Source: FAO Yearbook of Forest Products 2011.

The EU is world’s largest importer of roundwood. In 2006, roundwood volume was 28 million cubic metres. The biggest importers (and often producers) of roundwood are: Austria – 8.3 million m<sup>3</sup>, Germany – 7.6 million m<sup>3</sup>, and Sweden – 7.5 million m<sup>3</sup>. Poland imports 3.4 million m<sup>3</sup> roundwood which ranks her 7<sup>th</sup> among EU countries (tab. 11).

**Table 11.** Import of roundwood to the EU Member States in 2011

No.	Country	Volume (thous. m <sup>3</sup> )
1.	Austria	8252
2.	Germany	7657
3.	Sweden	7519
4.	Finland	5823
5.	Belgium	4433
6.	Italy	4376
7.	Poland	3450
8.	Spain	2356
9.	France	1513
10.	Luxembourg	1104

Source: FAO Yearbook of Forest Products 2011.

Europe is also an important exporter of roundwood. The annual exports of roundwood total 36 million cubic metres on average. The biggest exporters include France – 7.2 million m<sup>3</sup>, Latvia – 5.3 million m<sup>3</sup>, Germany – 3.7 million m cubic metres and the Czech Republic – 3.6 million m<sup>3</sup>. Poland’s exports of roundwood in 2011 amounted to 1.9 million cubic metres (8<sup>th</sup> position in the EU Europe, tab. 12).

**Table 12.** Export of roundwood from the EU Member States in 2011

No.	Country	Volume (thous. m <sup>3</sup> )
1.	France	7228
2.	Latvia	5264
3.	Germany	3652
4.	Czech Republic	3599
5.	Estonia	2799
6.	Slovakia	2684
7.	Lithuania	1990
8.	Poland	1904
9.	Hungary	1276
10.	Slovenia	1142

Source: FAO Yearbook of Forest Products 2011.



**Table 13.** Forest products in the EU Member States in 2011

Position	Timber products							
	Sawnwood		Panels		Pulpwood		Paper and cardboard	
	Country	Production (thous. m <sup>3</sup> )	Country	Production (thous. m <sup>3</sup> )	Country	Production (thous. tonnes)	Country	Production (thous. tonnes)
1	Germany	22 628	Germany	12 092	Sweden	11 858	Germany	22 704
2	Sweden	16 800	Poland	8 396	Finland	10 362	Finland	11 329
3	Finland	9 750	France	5 765	Germany	2 725	Sweden	11 298
4	Austria	9 636	Italy	4 361	Portugal	2 107	Italy	9 130
5	France	8 675	United Kingdom	3 384	Austria	2 005	France	8 527
6	Czech Republic	4 454	Austria	3 335	Spain	1 976	Spain	6 203
7	Romania	4 442	Spain	2 993	France	1 837	Austria	4 901
8	Poland	4 424	Romania	2 824	Poland	1 102	United Kingdom	4 341
9	Latvia	3 432	Belgium	2 177	Slovakia	716	Poland	3 756
10	United Kingdom	3 279	Finland	1 352	Czech Republic	700	Netherlands	2 748
Sum	–	87 520	–	46 679	–	35 388	–	84 937

Source: FAO Yearbook of Forest Products 2011.

In 2011, the EU-28 was the biggest producer of coniferous sawnwood – 29 per cent, as well as paper and cardboard – 27 per cent. It was also the second, after the USA, producer of pulpwood – 22 per cent and the third exporter of sawnwood (after Canada and Russian Federation). Within the EU Poland ranks the 8<sup>th</sup> position in sawnwood production, the 2<sup>nd</sup> position in panels manufacturing, and the 8<sup>th</sup> and 9<sup>th</sup> positions in pulpwood production and paper and cardboard production, respectively (tab. 13).

### Production and use of renewable energy

A substantial amount of energy is obtained from wood products (biomass). There is a marked upward trend in the share of energy production from renewable sources (including wood) in total energy production in the EU-27, which was 8.9% in 1995, 10.6% – in 2000 and 12.5% – in 2010 (Eurostat 2013).

The share of energy generated from wood increases at a similar pace accounting for 4.8% in 1995, 5.5% – in 2000, and 7.3% in 2011.

As an example, in Italy, Portugal, Cyprus and Luxemburg almost all primary energy comes from renewable sources. In Portugal, wood has a remarkable share in energy production staying at a level of 52%. In Luxemburg, on the contrary, the share of wood as an energy source decreased from 33.0% in 1995 to 21.2% in 2004, but increased again to 32% in 2011. In Cyprus, the decrease was even greater – from 27.0 per cent in 1995 to 3.9 per cent in 2004, and some 10% in 2011.

Poland is among the countries with a low energy production from renewable sources (mainly from wood biomass). Energy production from renewable sources in our country accounts for about 7.2% (2010) of total energy production. Also Belgium, Bulgaria, the Czech Republic, Germany, Greece, France, Italy, Cyprus, Luxemburg, Hungary, Malta, the Netherlands, Slovakia and Great Britain and Island are in the group of the countries with low renewable energy production, *i.e.* generating less than 10 per cent of total energy production.

The consumption of energy from renewable sources in the EU-27 countries in 2010 accounted to 12.5%, of which half came from wood (5.5%). The highest renewable energy consumption is in Latvia – 34.6% (27% from wood), Sweden – 33.9% (16% from wood), Finland – 24.5% (21% from wood). It is worth mentioning that high production of renewable energy in a given country does not necessarily go hand in hand with high consumption. Cyprus can serve as an example (Eurostat 2013).

### Employment in forestry and related sectors

Data on the employment in the forest-wood sector in the EU are based on the available annual and quarterly survey (*Labour Force Survey – LFS*) of the economic activity of people aged 15 and older. The survey results show that employment in forestry, manufacturing industry and related sectors in the EU-28 in 2005 amounts to approx. 2.7 million persons with staffing being highest in the manufacturing industry (55 per cent). The level of employment in forestry and services related to forestry is illustrated in table 14. In this respect, Poland is second after Romania (GUS 2013).

**Table 14.** The level of employment in forestry and services related to forestry in 2010

No.	Country	Employment in forestry and forest services (thous. persons)
1.	Romania	44
2.	Poland	44
3.	Italy	43
4.	Germany	43
5.	Spain	38
6.	Sweden	26
7.	France	25
8.	Latvia	24
9.	Finland	23
10.	Czech Republic	18

Source: LFS, following GUS 2013.

### CONCLUSIONS

Based on the information presented in the paper it may be pointed out that against the background of other EU Member States Poland is characterized by vast forest

and timber resources. With more than 9.3 million ha of forests and 2 billion m<sup>3</sup> of standing volume Poland is located in first ranks. However, in view of a large area of the country and large population share of forest lands in the total area of the country and the average forest area per inhabitant are low.

As regards the health condition of forests Poland is located in the middle of the rank. The high share of protected areas makes Poland one of the leaders in forest protection within the EU Member States. It must also be noted that due to forest species composition and climatic conditions Poland is one of the most vulnerable countries to forest fires.

Poland is among the countries with the high volume of harvested timber per capita. As regards import and export of roundwood in absolute values Poland is high-ranked, too. It is also a significant producer of wood-based panels, sawnwood and pulpwood, as well as paper and cardboard. Forest sector in Poland employs 44 thousand people. This is a significant number when compared with other EU Member States.

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